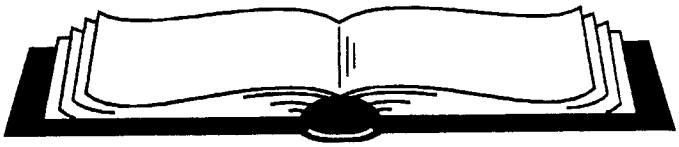
Code # 510
(for office use only)

NEW JERSEY

1999-2000 Guidelines and Application



BEST PRACTICES

ORIGINAL

Deadline for Application to County Office: NOVEMBER 22,1999

Category	Educational Technology (Application is limited to one category. See page 3 for details.)
Practice Name	Inventions and Innovation Course
Number of Schools with Practice	One (If more than one school or district, read and complete information on page 2.)

County	Passaic
District (Proper Name)	Wayne Township Public Schools School District
District Address	50 Nellis Drive street/p. o. box
	Wayne, N.J. 07470 city zip code
District Telephone	973-633-3000 Fax 973-633-3058 Email
Chief School Administrator	Dr. Ray V. Kwak
Nominated School #1 (Proper Name)	
School Address	Schuyler-Colfax Middle School
	street/p. o. box 1500 Hamburg Tpke.
	city Wayne , N.J. zip code 07470
School Telephone	973-633-3130 Fax 973-633-3095 Email
School Principal	Mrs. Dorothy Lozauskas
Program Developer(s)	Mr. John Frascatore, Michael Adjan
Chief School Administrator's or Charter School Lead Person's Signature	

FOR USE BY COUNTY SUPERINTENDENT OF SCHOOLS ONLY

Approved: ✓ Yes ___ No **County Superintendent's Signature** Maria Ruccella

NEW JERSEY STATE DEPARTMENT OF EDUCATION

NEW JERSEY

BEST PRACTICES

1999-2000 APPLICATION

510

Application Requirements:

- **RESPONSES to the information and the statements below must be ANONYMOUS.** No reference should be made to the names of the district or the school(s). Use the words "the school" or "the schools" in referring to the applicant in responding to the statements.
- **USE ONLY THE SPACE PROVIDED ON THE APPLICATION FORM on pages 1, 2 (if applicable) and 4 and THE NUMBER OF LINES SPECIFIED FOR RESPONSES to the statements.** Do not include any additional materials, as they will not be reviewed in the selection process.
- Application must be **keyboarded on 8 ½" x 11" white paper, portrait** format. **Ten-point or larger computer font** or **twelve-pitch or larger typewriter font** must be used. (This sentence is in ten-point.)
- **KEYBOARDED RESPONSES** to the statements below must be **no more than a total of three pages. Keyboard the statement followed by the response.** Format your response to the number of lines specified.
- **The information on page 4 and the keyboarded responses** to statements must be printed or copied **on one side of the page. The information on pages 1 and 2 (if applicable)** must be printed or copied **on one side of the page.** Staple pages 1 and 2 (if applicable) and 4 and the keyboarded responses together.
- **The original application must be signed by the district chief school administrator or charter school lead person, indicating his/her approval.**
- **The original and seven copies of the application** must be submitted to the county superintendent of schools by **November 22, 1999**, with the **Itemized List of District Applications** form. Keep the seven copies of each application together with the original containing the signature of the district chief school administrator or charter school lead person on the top of each set.
- **FAILURE TO COMPLY WITH THE PROCEDURES FOR SUBMISSION OF THE APPLICATION MAY RESULT IN THE ELIMINATION OF THE APPLICATION.**

The following data is required to assist the panelists in the evaluation of the application:

Type of School	Grade Levels
___ Elementary School	
_X_ Middle School	6,7,8
___ Junior High School	
___ High School	
___ Other: _____	

Practice Name Inventions and Innovations Course

Number of Schools with Practice 1

Number of Districts with Practice 1

Check the ONE CATEGORY into which the practice best fits.

___ Arts (Visual and Performing Arts)	_X_ Educational Technology	___ Safe Learning Environment
___ Assessment/Evaluation	___ Health and Physical Education	___ School-to-Careers/Workplace Readiness
___ Bilingual Education and Diversity	___ Language Arts Literacy	___ Science
___ Citizenship/Character Education	___ Mathematics	___ Social Studies
___ Early Childhood Education Programs	___ Professional Development	___ Special Education
___ Educational Support/Guidance and Counseling Programs (services contributing to high student achievement)	___ Public Engagement (family involvement and partnerships with business, community and/or higher education)	___ World Languages

1. Describe the practice proposed for recognition, and list its objectives. Detail how the practice is innovative, how it promotes high student achievement and how it can be replicated. **(Maximum of 50 lines for response)**

2. Describe the educational needs of students that the practice addresses and how they were identified. List the *Core Curriculum including the Cross-Content Workplace Readiness Standards** addressed by the practice and describe how the practice addresses the standard(s). **(Maximum of 50 lines for response)**

3. Document the assessment measures used to determine the extent to which the objectives of the practice have been met. **(Maximum of 60 lines for response)**

*The 1996 edition of the ***Core Curriculum Content Standards*** published by the New Jersey State Department of Education was disseminated to all districts and charter schools and is available on line through the department's website at http://www.state.nj.us/education.

New Jersey Best Practices 1999- 2000 Application

1. **Describe the practice proposed for recognition, and list its objectives. Detail how the practice is innovative, and how it promotes high student achievement and how it can be replaced.**

Practice proposed for recognition: "Inventions and Innovations" Courses for Grades 6 and 8

Our middle school offers its students an array of elective cycle courses, each lasting approximately seven weeks. These courses are taken in addition to the traditional year-long academic subjects. The specific cycle course which is proposed for recognition is our highly successful " Inventions and Innovations" course, of which there is a sixth grade and also an eighth grade curriculum.

"Inventions and Innovations" is a course that entirely engulfs the student in hands – on activities that stem from their creative problem solving. The main objectives are to enable the students to hone their skills of critical thinking, collaboration, brainstorming of ideas in problem solving, articulation of their thinking, and also to understand the inventive nature that is the foundation of technology. These skills have a great potential for transference into all areas of the students' lives.

The sixth grade "Inventions and Innovations" course sets the tone from the very first day the class meets. The students are divided randomly into teams and are supplied with two pieces of newspaper, tape, and a can filled with assorted nuts and bolts. Each team is to figure out a way to use the newspaper to suspend the greatest number of nuts/bolts in the can without the paper tearing. A class competition ensues.

Each subsequent problem solving project is organized so that students brainstorm ideas and then build their inventions. Competitions lead to exceedingly high student motivational levels and excitement!

The grade 6 curriculum includes the following projects: (1.) The students study hydrodynamics with respect to hull design, keels, and rudders of boats. The students then design boats with sails, build them of styrofoam, and participate in a competition in which their boats race in a specifically designed water tank. (2.) The students study magnetism and its application to magnetic levitation and high speed trains. The students build vehicles that levitate based upon repelling magnetic charges, wire them to a DC motor (with transformer) for propulsion and then race their Maglevs on a track. (3.) The students design and build hovercrafts using cardboard and balloons. (4.) Student – built hot air balloons demonstrate the gas laws of physics. (5.) Students design a tower of sticks using 144 inches of 1/8 inch balsa wood. The goal is to build a tower that will support the greatest amount of weight as compared to the weight of the tower. The competition is videotaped and played back to analyze the factors of compression, tension, span, and deflection. (6.) The students study robotics, then design and build robotic arms that are involved in competitions to do various tasks. These are but a sampling of our grade 6 curriculum projects.

The grade 8 curriculum builds upon grade 6 and includes the following projects: (1.) Model rocketry incorporates the calculations of velocity, altitude, and acceleration. The students' rockets take flight and measurements are made. (2.) After aerodynamics are studied, the students design and build wood race cars that will be propelled by carbon dioxide cylinders. Races are held and videotaped for ultimate analysis of race car design and performance. (3.) Wind energy is studied and students experiment with windmill power. (4.) Bernoulli's Principle takes form with the students building model airplanes. Again, these are only a sampling of the collaborative problem solving done by the students.

2. **Describe the educational needs of students that the practice addresses and how they were identified. List the "Core Curriculum" including the "Cross-Content Workplace Readiness Standards" addressed by the practice and describe how the practice addresses the standard(s).**

The educational objectives established by our Board of Education center on the needs of the whole child. Academic competence, interpersonal skills, development of a healthy life style, and development of skills needed to function as a productive member of a democratic society form the heart of our set of objectives. Skill development for the next century encompasses the ability to successfully use technology in many forms, the ability to problem solve by utilizing higher order thinking skills, the ability to work collaboratively within a diverse population, and the ability to effectively communicate. These skills are all reflected in the "N.J. Core Curriculum Cross- Content Workplace Readiness Standards."

Our "Inventions and Innovations" course aligns perfectly with the Cross – Content Workplace Readiness Standards:

Standard 1 – All students will develop career planning and workplace readiness skills.

Within the framework of solving a given problem and then designing and contructing an appropriate model/invention, the students learn to effectively work as a team. The skills required in this regard include a serious work ethic (needed to see the project to its completion), dependability, promptness, interpersonal skills, and a positive attitude. The teacher oversees the work of the teams. Expectations are clearly set with respect to the functioning of the team members. The ultimate success of each project is a function of the effectiveness of the team. The collaborative skills learned and reinforced throughout this course are definitely transferable into other subject areas and eventually into any career. In middle school, we are setting a solid foundation for life in the work force.

Unlike many purely academic subjects, the students in our "Inventions and Innovations" course learn skills in woodworking, carving, building, accurate measuring, using sanders and saws, as well as many other tools. Both boys and girls acquire skills that may spark interest in a career or hobby. Additionally, the subject matter (e.g., architecture, lasers, aerodynamics, hydrodynamics, energy conversion, and even archaeology) covered in the context of problem solving may prove to be the beginning of a career plan.

Standard 2: All students will use information, technology, and other tools.

As our students are introduced to each new technological scenario, the science underlying the technology is first presented. Fox example, lasers are studied in depth, then the students must brainstorm ideas to figure out how to "bounce" the laser light around the perimeter of a designated area of the classroom. Each team is given a set of mirrors and the students must calculate the angles at which to set the mirrors. Similarly, magnetic levitation is studied before the students design their own Maglev vehicles. They are truly learning how technological systems function and are learning to select appropriate tools.

The computers with Internet accessibility provide our students with information and provide word – processing capabilities as well. The "Inventions" classroom is contiguous with our new computer lab with its thirty Dell computers.

Standard 3: All students will use critical thinking, decision-making and problem-solving skills.

Every Cumulative Progress Indicator listed in the "Core Curriculum Cross-Content Workplace Readiness Standard #3" occurs in our "Inventions" course. As previously discussed, the students utilize the steps involved in the scientific method of problem solving which leads to designing an experimental product or a working solution to the problem. Solutions or products are evaluated, alternative solutions are generated, and careful records are kept. Critical thinking skill development is the heart of our course.

Standard 4: All students will demonstrate self- management skills.

Again, every "Cumulative Progress Indicator" is successfully addressed in our "Inventions" course. The students learn collaborative skills needed to work effectively with a diverse group of peers. Since the class includes Special Education students, multiple handicapped students, as well as Regular Education students, all must learn to respect what each has to offer the team. Goals are set, ideas are shared, information is gathered, reports are completed, and competitions are enthusiastically entered. Each child learns that he/she has an important role to play if the team is to successfully solve the problem presented to them. A group can accomplish far more than a single individual.

Standard 5: All students will apply safety principles.

Because this course requires the students to use various tools, the course is taught by Industrial Art teachers who conscientiously demonstrate the proper use and safety principles associated with each tool. All protective gear (e.g., goggles, aprons) are worn; safety procedures are learned by the students; injury prevention is stressed.

"Inventions and Innovations" provides the middle school students with the joy of discovery and the magic of new ideas. It is an opportunity to expand the mind to new possibilities. The students love it!

3. **Document the assessment measures used to determine the extent to which the objectives of the practice have been met.**

Every project done by the students is accompanied by documentation worksheets. As the students work through the steps of the scientific method of problem solving, they are required to record their strategies, Internet – researched information, successes, problems encountered, and how these problems were overcome. All design specifications regarding measurements and accurately drawn diagrams are required. The ultimate evaluation is a true performance – based assessment in which the team's product is graded as it "stands alone" and in competition. Class participation and effectiveness as a team member are also included in the student's grade.

Based upon the students' marking period grades, the "Inventions and Innovation" course is meeting its objective. The students' enthusiastic labors have resulted in approximately 90% of their grades being an "A" or "B" . No students have failed. This course is one of the most popular courses in our school. Regardless of the student's IQ, learning disabilities, socioeconomic background, or prior school successes, every student has the opportunity to increase his/her thinking skills and be a participating member of a problem solving team. These collaborative and problem solving skills will last a lifetime.

It must also be noted that this course is not very expensive to fund. It can be replicated with ordinary "every day" materials, for the most part. The heart of the course lies in the philosophy that children are creative and that creativity, coupled with knowledge, will result in inventions and innovations if we give them the chance.